"It's More Like a Letter": An Exploration of Mediated Conversational Effort in Message Builder

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Communication technologies for maintaining close personal relationships are often designed to be lightweight and easy to use. While these properties allow for relationships to be maintained with speed and efficiency, they may come at the expense of more effortful messages that are constructed with thought, time and care. This raises the question of how communication technologies might be designed to provoke moments of effortful maintenance from their users. To explore this question, we designed and implemented *Message Builder*, a text-based communication system that encourages relational partners to send increasingly long messages. We report findings from a field trial in which 14 dyads used Message Builder for everyday relational maintenance. While some of the effort-provoking features of Message Builder were described as problematic, we found that the system had value in guiding users towards authentic and meaningful effort investments that were valuable within their individual relationships.

CCS Concepts: • **Human-centered computing** → **Collaborative and social computing theory, concepts and paradigms**; **Social media**; *Collaborative and social computing devices*;

Additional Key Words and Phrases: Communication technologies; Effort; Relational technologies; Social media.

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1 INTRODUCTION

Close personal relationships are maintained by a variety of communications media. Whether by email, instant messaging (IM), video or voice calls, people frequently adopt and adapt digital technologies to sustain connections with their loved ones [32, 41, 42]. One beneficial property of these technologies is that they can facilitate rapid and lightweight interactions [34], allowing for relationships to be maintained easily and at low cost [4, 55, 59]. These qualities arise from the fact that communication systems are often designed to be easy-to-use, with the minimisation of effort championed above all else. This philosophy is evidenced by an increasing number of intelligent or automated tools that alleviate the 'burden' of writing in IM applications [30]. For example, Facebook's *Messenger* app now includes an interactive assistant that provides automatic

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Sticker suggestions, and Google's *Allo* app includes a smart replies feature, which generates a set of potential responses to conversation by analysing messages that have been exchanged previously.

Researchers in HCI and CSCW have begun to question this drive for effortlessness in the design of communication platforms. In particular, questions have been raised by a body of work that suggests people in close personal relationships appreciate the investment of effort into communication [21, 33, 34, 46, 47] and that effort in the selection and use of communication outlets is interpreted as a sign of mutual affection and care [6, 17, 38, 50, 60]. Correspondingly, there has been an interest in designing chat systems that use effort as a foremost driver of the interaction design, thereby providing users with positive opportunities for investing effort into their messages [30].

However, there are currently two issues that hamper our understanding of how to support meaningful effort in communication systems. The first is that there has been no study of how such systems could foster effortful interactions, beyond a selection of initial design concepts [30] and the observation that people may benefit from technologies which encourage effort [21, 46]. This is important because effort could be resented just as easily as it could be valued, depending on the manner in which it arises [22]. There is thus a need to consider how effort can be leveraged productively and in a way that has utility for close personal communication. The second issue is that prior research on effortful exchanges has focused on isolated or one-off acts of communication [e.g. 30]. Although such acts form an important part of the communication landscape, a focus on one-time exchanges ignores the way in which effort might be valued as it accrues over time. If it is truly the case that communication systems could enhance their users' relational maintenance practices by leveraging effort, then we see a need to explore these issues in practice.

To this end, we designed and implemented *Message Builder*, a prototype communication system that has a number of features which seek to provoke effort. In particular, the system requires users to send increasingly long messages, a feature that we use to probe the means by which effortful interactions can be prompted by a chat system and whether certain kinds of effort are differentially appreciated in communication. Through a field deployment, our study draws attention to the ways in which effort can be usefully provoked and structured by mediating technologies, providing a basis for future work on designing with effort in mind. The paper therefore contributes:

- The Message Builder system, a communication platform designed to explore the ways in which users might be guided towards effort investment.
- Findings from a field trial of Message Builder, accounting for values and practices that emerged in use of the system.
- Directions for future work on designing around effort in communication technologies, attending to the need for such effort to be authentic and meaningful.

2 BACKGROUND AND RELATED WORK

In this section, we provide the groundwork for our study by first considering the meaning of effort in HCI vis-à-vis its meaning in close personal relationships. We then consider how effort has been raised as a design property for the development of communication platforms, before examining how one might design to encourage effort in communication.

2.1 Understanding and Characterising Effort

While the term 'effort' is commonly used in HCI and CSCW, we note that the literature lacks agreement as to the value of effort in different settings. As such, there is currently no widely accepted definition of effort in the HCI literature. One early definition by Zijlstra [62] positions effort as work that is required to handle the demands of a task. In Zijlstra's view, any task imposes a degree of workload on the human operator. Effort describes the work that is done to handle and

alleviate the demand imposed by this workload. Such effort may be physical or mental and may be experienced differently in accordance with a person's aptitude for the task [62].

This perspective on effort has its roots in task-oriented approaches to systems design, where a designer's emphasis is typically oriented towards streamlining users' interactions and identifying areas in which effort can be minimised [e.g. 26, 52]. This is often for good reason, and there are many areas of human activity in which it makes sense to reduce user effort, such as when designing medical devices for older adults who have limited manual dexterity [44].

However, this conceptualisation of effort is problematic when it is applied to the arena of close personal relationships [30]. While it is certainly possible to conceive of a relationship as an entity that requires work to maintain, such a view does not reflect the subtle, intimate and enriching qualities of caring connections [51]. Effort in this context thus represents something quite different, and has been aligned with the notion of relational maintenance, which refers to "efforts to keep a relationship in a specified state or condition" ([15], p. 164). This type of effort is important for sustaining the health of personal relationships, and helps to foster feelings of closeness, gratitude and mutual affection [1, 13]. In this sense, effort becomes a property that is not to be minimised *per se*, but is rather one to be nurtured and encouraged through designs that are attuned to the complexities of close relationships [30, 58].

In light of these perspectives, recent work has attempted to articulate the various forms of effort that can arise in the use of communication technologies, and hence how this effort might be differentially valued. Markopoulos [37] delineates two forms of effort: *procedural* and *personal*. In his view, *procedural* effort refers to the work required to operate an interactive system. Example tasks include starting a device or navigating to an application, both of which he describes as not valuable. Conversely, *personal* effort is described as valuable because it represents work that is done in service of the message recipient. Examples include the selection of particular media or saying things that the recipient might like to hear. Kelly et al. [30] expand on the notion of personal effort by describing qualities of meaningful effort that can arise across a range of communications media. Examples include the investment of *discretionary effort*, which characterises messages that are delivered through a sender's own volition rather than through external prompts, and effort that is *responsive to the recipient*, which refers to messages that reflect the personality, desires or wishes of their intended reader. Their work also highlights that the distinction between procedural and personal effort is not straightforward; procedural effort may in fact be valued if it gives insight into the personal effort that is invested by a sender [30].

While these studies have utility for informing the work of designers, they have not investigated how communication technologies could foster effort when used in real-world relationships. Our work extends this literature to provide additional insights into the way in which effort can become meaningful in communication, and further explores the dichotomy between effort that is relationally sustaining versus that which is expended in the mere use of a system.

2.2 The Value of Effort in Personal Communication Technologies

Researchers in CSCW have for a long time been interested in designing technologies to support close relationships [51], and a vast number of systems have been designed to support feelings of connectedness between people who care about one another [see 27, for a review]. Within this literature, several studies have recognised that effort in communication is valued by people in close relationships [21, 34, 46, 47]. CSCW research on social media has similarly noted that the selection of communication outlets on platforms such as Facebook can exemplify effort and care [7, 60]. For example, choosing to comment on a user's post may be regarded as expressing greater affection than low-cost 'likes' [50], and a study by Burke and Kraut [6] demonstrated that receiving high-effort messages on Facebook is associated with increases in personal well-being.

These findings lend support to the suggestion that, rather than deferring to speedy and lightweight exchanges, communication technologies could be designed to prompt moments of effortful maintenance and reflection from their users [53]. King and Forlizzi [33] argue that devices for close relationships should forego lightweight exchanges and instead demand effort in order to foster moments of 'emotional resonance'. However, lightweight exchanges can play a valid role in the maintenance of relationships [29] and it is important to recognise that not all social exchanges warrant the investment of time and effort, particularly when messages play a coordinative role [e.g. 23]. Yet this observation does not preclude the potential for effort to be placed as a foremost parameter in the design of communication systems [30]. The present study seeks to explore this possibility through implementing a system that lends itself to effortful exchanges, and provides an understanding of how these exchanges were valued by people in real-world relationships.

2.3 Designing for Valued Effort in Communication

In terms of designing to support effort, some prior research has listed properties of existing communications media that are valued with regards to effort. Riche et al. [46] report findings from design workshops with older adults. Their participants viewed high-effort communications such as physical cards and letters to be more intimate than digital systems, which were described as 'less valuable' and 'less sensual' than their analogue counterparts. Similarly, Lindley et al. [34] report the views of older adults who described communication as worthy of time and effort, perceiving these qualities to be lacking in digital systems.

While these insights are instructive in terms of understanding what people value in communication, they do not provide examples of how effort can be utilised by designers in a way that is meaningful and sensitive to the needs of close relationships. One exception is the work of Kelly et al. [30], who proposed two systems (*Shake-a-Memory Calendar* and *Craft Box*) that provide outlets for meaningful effort investment. However, these systems did not progress past the initial design stage, and thus there has been little throughput in terms of understanding how these tools might foster effort in a way that is valuable for real-world relationships.

The question of how effort might be realised through design is currently open. We see this issue as multifaceted, covering not just the forms of effort that can be invested into communication but also the impact of effort on users' experiences with (and subsequent acceptance of) mediating technologies. Work elsewhere in HCI is indicative of these concerns. For example, Cockburn et al. [9] examined effort in the context of spatial learning. They found that increasing users' interaction effort (in terms of the cost required to check the meaning of occluded characters on a keyboard) led to better spatial memory for keyboard layout. This occurred because users put more effort into committing the characters to memory after the interaction cost was raised. However, Cockburn et al. also found that users subjectively preferred an easier-to-use interface, even when this interface fostered objectively worse performance. This draws attention to a potential trade-off between effort and user experience, in turn suggesting that effort is a property that needs to be leveraged with care and attention by designers. While it may be quite feasible to demand effort by making an interface 'harder to use' [46], i.e. by arbitrarily raising the effort required to perform basic operations, there is no guarantee that such an approach will have value in the context of close relationships [22].

The present investigation pushes on this challenge by studying *Message Builder*, a system that was designed to prompt effort from its users when engaging in everyday conversation. The study allows us to explore the ways in which particular features of the system did (and did not) encourage meaningful effort, providing an initial grounding for future designs that are sensitive to the forms of effort people wish to experience when communicating with close relational partners.

3 MESSAGE BUILDER: DESIGN AND APPROACH

In creating Message Builder, we wanted to develop a system that would allow us to explore:

- How communication technologies might encourage effort in messaging.
- How communication effort might be valued (or not) in mediated close personal relationships.
- How effort is realised across a series of messages in a conversational exchange.

Before describing our system, we emphasise that the artifact we have created is not intended to be a canonical example of how communication systems should realise effort. Rather, it represents one solution within a space of possibilities, and it is therefore not the *only* possibility. We see our platform as an initial probe [16] for exploring the plausible design space of effortful communication, and for discovering what is valuable to people in the context of their relationships. The importance of our work is not in identifying precisely how we should design to support effort, but is rather in probing concepts that are meaningful and which are revealing about how effort can be employed in a way that people find valuable in their everyday lives [cf. 43, 48].

To develop our application, we began with group ideation sessions in which the members of our research team generated concepts for technologies that could invoke effort in communication. The ideation in these sessions was guided by the findings of previous work on meaningful effort [30]. One of the ideas generated from these sessions was for a system that progressively required greater effort from its users, such that it might encourage the 'building up' of effort in conversation to convey each person's investment. This general idea appealed to us because it seemed relatively straightforward to implement and yet offered a rich set of possibilities for exploring our key issues of concern. For example, how might people engage with such a system and structure their responses when using it? At what point might the building up of effort become resented?

These questions led us to pursue an implementation of the idea, focusing on text-based communication in the style of IM. This is because IM (and text-based communication in general) is known to play a role in the maintenance of relationships [24, 25, 42, 54] and is an ongoing area of interest within the literature on the design of communication technologies [e.g. 2, 28, 43]. Moreover, text remains a primary modality for communication in popular systems such as *WhatsApp*, *WeChat* and *Facebook Messenger*. Focusing on text would therefore allow potential users to interpret our design in relation to the features of contemporary messaging applications.

3.1 Message Builder Implementation and Features

Our developed system, Message Builder (Figure 1), is a text-based chat application. The system supports one-to-one conversations in which messages can be exchanged asynchronously and in real time. Message Builder was implemented as a web-based system to allow users to access it on desktop and mobile computing devices. The system did not support the exchange of expressive media such as pictures and audio, but did allow users to send emoji since they are based on Unicode. Message Builder was written in PHP and was tested on popular desktop and mobile browsers including Chrome, Edge, Firefox, Opera and Safari. In terms of functionality, the system saved a temporary record of message state in the text input field, allowing the user to switch browser tabs and windows while composing a message. However, if the user closed their browser and later reloaded the Message Builder page, any previously unsent message would have been lost. (While this could lead to the loss of messages, no participant mentioned that this happened during the study.) All messages sent through Message Builder were timestamped and saved to a database that was hosted on our secure university servers.

Message Builder has a number of design features that are intended to prompt users to invest effort in their communication. The key features of Message Builder are:

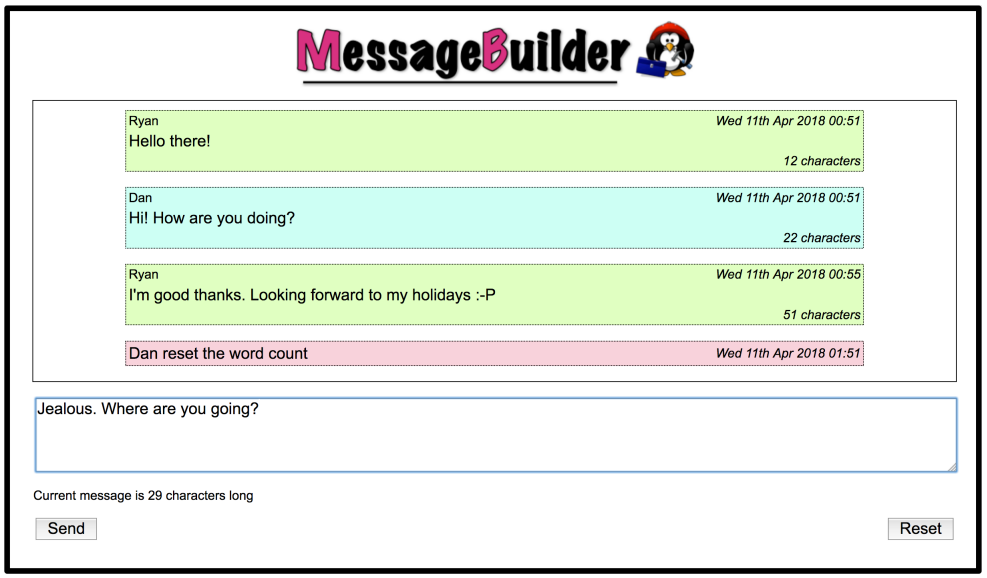

Fig. 1. The Message Builder system, showing an example conversation created by the authors. User 1 (Ryan) appears in green and User 2 (Dan) appears in blue. In the example, Dan has just returned the character count to zero by pressing the Reset button and is now writing a reply to Ryan's last message.

- **A requirement that each message sent must be longer than the previous message**. The intention here is to explore how prompting users to write more in each message might translate into a meaningful practice within their relationship. The functionality is achieved through monitoring the character count of each message and by preventing messages from being sent unless they are at least one character longer than the last. If a user tries to send a shorter message, they receive a pop-up notification telling them that the message is not long enough. The character count applies to both users within a conversation, meaning that the chat is continually escalating in terms of raw message length.
- **A Reset button**. Users can press this button to reset the character count and return the tracked value back to zero. This can be done at any time, and affords users the opportunity to choose to reset instead of exceeding the count of the previous message. This aims to prevent frustration or abandonment that could be caused by the character count.
- **A visible record of the character count**, both for posted messages and those under construction (see Figure 1). This feature was initially intended as purely functional, providing a simple cue to make users aware of the length of their current message in relation to the number of characters required by the previous message. However, it also doubled as a means for promoting reflection over the value of the count with respect to conveying effort.
- **A lack of notifications**, which removes a convenient feature of contemporary messaging apps and means that users have to invest effort in checking whether they have received a new message in Message Builder.

Our intention with these features was to be exploratory and provocative, allowing for a range of opportunities to investigate how different kinds of effort might (or indeed might not) lend themselves to productive relational maintenance. It is therefore not our intention to position these features, nor the Message Builder system itself, as examples of 'good' or 'bad' effort-centric design. Our aim was to use Message Builder as an opportunity to learn about things that matter to

people, and part of our work is to understand how properties of the system shaped participants' communication practices while provoking or discouraging the investment of effort in messaging.

In terms of design rationale, we saw the features of Message Builder as having the potential to shape participants' communication behaviour in an interesting way. For example, requiring progressively more text could act as a simple nudge towards the investment of time and thought into communication, and yet it could just as easily be resented for hampering other kinds of exchange. Likewise, the lack of notifications might transform the act of receiving messages into one that is very different from existing IM applications, but might cause people to lose track of the conversation due to limited awareness of what is happening. These and other considerations about the design are unpacked in more detail by the findings of our field study.

4 METHODS

Any understanding of how technology can support relational maintenance is best derived from real-world relationships. As such, we conducted a field deployment to understand how Message Builder might be used in everyday life, and to probe the values that might emerge around its design and use. Importantly, we wanted to understand how this system might complement the other technologies that our participants used to maintain their relationships.

Our study employed a mixed-methods approach, beginning with interviews and questionnaires to gain insight into participants' existing relational maintenance practices. We used post-study interviews to understand how Message Builder was integrated into these practices and to explore participants' reactions to the design. Finally, log data provided us with information about the number of messages sent, the length of messages, and the frequency of chat resets. All of our materials and procedures were designed in accordance with a local ethics checklist at the third author's research institution.

4.1 Participants

Twenty-eight people (14 pairs) volunteered for the study. Participants were self-selecting, recruited through adverts on our university noticeboard, through word of mouth, and snowball sampling. The study was advertised as a "trial of a new app for communication", and was open to pairs of two or more. We did not receive interest from anyone wanting to participate in a group of more than two. Each person was paid £30 for their involvement in the study (£60 per pair).

Our recruited sample was diverse, with 9 countries of origin: 16 Malaysian participants, 2 Pakistani, 2 Indian, 2 Nepalese, 2 Nigerian, 1 Vietnamese, 1 Filipino, 1 Syrian and 1 British. (The high number of Malaysian participants arose through an advert for the study being shared to a society for Malaysian students by a participant.) Eight participants identified as male, 20 identified as female. All were fluent in English. Table 1 provides more detail about each of the pairs in our study. It can be seen that our sample comprises 10 platonic and 4 romantic relationships. Some of these relationships were co-located within the same household or city. Others were separated by considerable distance, spanning different cities or even different continents.

A notable feature of our sample is that the average age was 22.6 years (Range=19–33, Median=21). This means that our findings reflect the perspectives of relatively young, tech-savvy individuals. However, this is interesting as it means that our study captures the responses of a user group who make extensive use of mainstream communication apps in their everyday lives, and who might therefore be opposed to the introduction of 'effortful' communication technologies.

4.2 Procedure

We deployed Message Builder to each pair for a minimum of two weeks. Deployments were made across a two-month period in early 2017. Each deployment involved the following three phases.

Pair	Person ID	Age	Gender	Residence	Relationship	Living Situation	Frequency of Contact	RCI	Pre-use URCS	Post-use URCS
1	1	33	F	UK	CL-F	Together,	Daily	15	60	56
	2	29	F	UK		Same House.		13	62	63
2	3	28	F	UK	RP	Apart,	Daily	11	79	75
	4	31	M	Nigeria		Different Countries.		18	84	84
3	5	26	F	UK	RP	Apart,	Daily	21	82	80
	6	29	M	UK		Same City.		14	64	66
4	7	21	F	UK	CL-F	Apart,	Daily	9	69	68
	8	20	F	UK		Same City.		12	60	66
5	9	20	F	UK	CL-F	Apart,	Daily	11	57	58
	10	21	F	UK		Different Cities.		11	69	71
6	11	20	M	UK	CL-F	Together,	Daily	10	50	52
	12	21	F	UK		Same House.		12	50	51
7	13	21	F	UK	CL-F	Apart,	Daily	17	57	47
	14	21	F	UK		Same City.		11	55	60
8	15	21	F	UK	CL-F	Apart,	Daily	13	65	64
	16	21	F	UK		Same City.		13	57	52
9	17	20	F	UK	RP	Apart,	Daily	13	74	59
	18	19	M	UK		Different Cities.		12	73	66
10	19	21	F	UK	RP	Apart,	Daily	14	75	66
	20	22	M	USA		Different Countries.		12	83	82
11	21	22	M	UK	CL-F	Apart,	Several	11	46	50
	22	22	M	UK		Same City.	per week	11	51	51
12	23	22	F	UK	CL-F	Apart,	Several	6	41	40
	24	23	M	UK		Same City.	per week	12	45	43
13	25	22	F	UK	CL-F	Apart,	Daily	10	47	55
	26	20	F	UK		Same City.		10	62	55
14	27	19	F	UK	CL-F	Apart,	Daily	15	76	70
	28	19	F	Pakistan		Different Countries.		15	78	80

Table 1. Demographic, relational, and closeness information about participants in the Message Builder field study. For relationship type, CL-F = Close friends and RP = Romantic Partners. The RCI scale ranges from 3–30 and the URCS ranges from 12–84. Higher values denote greater closeness.

Phase One: Pre-Deployment. Participants enrolled in the study over email and provided informed consent through an online form. Participants received an instruction sheet explaining the research. The instructions were worded carefully to convey that participants were allowed to use Message Builder in any way they saw fit for maintaining their relationship.

Participants then completed an online questionnaire, which requested demographic information and a list of communication technologies used between the participant and their study partner. We also administered the Relationship Closeness Inventory (RCI) [3] and Unidimensional Relationship Closeness Scale (URCS) [14] scales. We used these measures to probe and understand the nature of the relationships between our participating pairs. We also checked for major imbalances in closeness within each relationship, though none were apparent.

After submitting their questionnaire, each participant was invited for an individual interview to gather more data about their communication routines with their partner. We opted to perform individual interviews because perceptions about communication technologies are often different within a pair [19] and because paired interviews may conceal mismatched preferences between relationship partners, making it important to survey the experiences of each person separately [2]. While it is still useful to perform additional pair interviews to allow for cross-comparison [49], we did not do this due to logistical and scheduling constraints. As shown in Table 1, some pairs were distributed across different cities and timezones, which would have made it hard to maintain a consistent protocol for pair interviews.

All interviews were one-to-one between the participant and first author. Twenty-two of the interviews were face-to-face and four were conducted over Skype. A further two participants (P10 and P28) were interviewed over email because these individuals were remote and had unreliable Internet and phone connectivity, making verbal interviews untenable. (This was primarily a bandwidth issue, meaning that it did not affect their use of Message Builder during the study.) Previous research suggests that email is an appropriate medium for collecting qualitative interview data [10, 40] and that the main impact is on the volume of data collected, where email responses are typically shorter but are to the point and evidence deep reflection on the topic at hand [12]. We found this to be true of the email responses that we collected, and we were satisfied with this outcome given that these responses were preferable to collecting no data at all.

We used an initial set of 12 interview questions that we tailored to each pair based on their questionnaire responses, e.g. by asking about activities that they had described completing together. For the email interviewees, we divided the question set in half and sent them in two separate mails. This lowered the initial burden on these participants and allowed us to probe their responses with follow-up questions [40].

In all of our interviews, we asked participants which communication systems (as listed in their questionnaire) they used most often with their partner. We also asked what they did with each system and what their main reason was for using each one. To ensure consistency in the data, we used responses provided by the first individual in a pair to cross-check their use of communication technologies with the second individual, e.g. if one person mentioned using Snapchat but their partner did not, we followed this up with them during the interview. In line with earlier work [30], we also probed for a specific, recent instance of when they or their partner had invested effort into a communication or relational act. This allowed us to reflect on the level of effort that they considered typical for that particular relationship.

At the end of the interview, participants were shown an example of Message Builder and were given a demonstration of its functionality. This served as an opportunity for us to answer participants' questions about the system. Email interviewees were sent a written explanation of Message Builder's functionality alongside a hyperlink to an example system, allowing them to respond with questions if necessary.

Phase Two: Deployment. After their interviews, each pair was given their own instantiation of the Message Builder application. Each participant was emailed a link that they used to access the system via their web browser. Individuals were only able to communicate with their study partner through this link. In addition, participants in the study were not able to access each other's Message Builder clients, and nor were they able to access the links of other pairs, meaning that the system became a private channel for use within each pair.

Participants were requested to use the system for a minimum of two weeks. Since we were interested in understanding how the system was adopted into participants' communication practices, we did not place requirements on where, when, or how frequently participants should use Message Builder. In addition, we did not monitor participants' use of the system during this time, e.g. by checking the logs or visiting the pages hosting their systems. However, participants were emailed midway through the deployment period to remind them about their participation in the study.

Phase Three: Post-Deployment. At the end of the deployment period, participants were emailed with a link to a second online questionnaire. This questionnaire re-administered the URCS to check for changes in relational closeness. We found that there were no statistically significant differences in closeness from before and after the study, $t(27) = 2.05$, $p=0.14$.

Finally, participants were invited for a second interview within 3 days of discontinuing use of Message Builder. These interviews were conducted face-to-face (24 participants), via Skype (one person) or over email (three participants). The interviews went into greater detail about participants'

use of Message Builder during the study period. We probed how, when, and where the system was used; practices around communicating through the system; their opinions about the accumulation of effort; and what they felt about each design feature (the requirement for increasing message length, the ability to reset, the visible character count, and the lack of notifications). Participants were thanked, debriefed and paid for their involvement at the end of the interview.

4.3 Analysis

Our data comprised participants' questionnaire responses together with their pre- and post-study interviews. We also collected anonymised log data about each pair's use of Message Builder, comprising message length, date and time of delivery, and the time and number of resets. We did not collect message content to avoid breaching participants' privacy and to encourage naturalistic use [2]. Participants were aware that their messages would not be monitored or analysed by the researchers before participating in the study. The content of messages was deleted from our database after the deployment had ended.

Participants' interview comments were transcribed by the first author. The first and second authors performed a thematic analysis [5] in two distinct stages. First, we engaged in independent cycles of inductive, open coding to identify concepts within the data and potential themes that could unite these concepts. We attended to the ways in which Message Builder was used; how the system was interleaved with existing technologies; and whether the system was at all valued in the context of the participants' relationships. We did this both at the level of the individual and the pair, allowing us to acquire a logical account of how the system was integrated (or not) within the routines of each relationship. In addition, we searched for points of overlap and distinction *between* pairs to understand how the system was used according to the type of relationship and geographic proximity. Second, we performed a round of deductive coding using the five high-level categories of meaningful effort identified by Kelly et al. [30]. This allowed us to consider how qualities associated with valued effort were enacted and recognised by our participants, both in the role of sender and recipient, and we aligned these qualities with our developed themes as appropriate.

5 FINDINGS

Our research interests are focused on effortful communication. As such, our results are structured around how our participants used Message Builder and how particular features were valued or resented with respect to effort. Quotes used in the results are attributed to specific participants in the study, ranging from 1–28 (see Table 1).

5.1 Patterns of Use and Acceptance

Before detailing participants' reactions to Message Builder, we first provide an overview of participants' existing communication practices so as to contextualise their use of our prototype.

5.1.1 Existing Technologies and Relationship Type. All participants reported using IM apps such as WhatsApp, Facebook Messenger and Telegram to maintain their relationship with their study partner. Sixteen people (8 pairs) used Snapchat, corresponding with recent work that has highlighted the popularity of Snapchat and its current role in the maintenance of relationships [39, 57]. Six pairs also used video and voice calling systems such as Skype, Viber and FaceTime. The use of particular media was conditioned by participants' individual circumstances and by the closeness of their relationship; for example, pairs 2 and 10, who were both in long-distance romantic relationships, described using video calls every day to connect with their partner. Those in platonic relationships were more casual and described engaging in sporadic interactions through WhatsApp or Snapchat. Most pairs described interleaving multiple communication technologies [41], with chat applications

used to maintain a conversational thread throughout the day [42] and video calls or face-to-face meetings occurring at other times. However, not all of the participants were in contact every day; pairs 11 and 12 were comprised of friends who described chatting infrequently, using either WhatsApp or Facebook Messenger to discuss work-related matters a few times per week.

5.1.2 Message Builder: Contexts of Use. Twelve participants reported using Message Builder exclusively on their mobile phone; nine reported using it solely on a desktop or laptop; and seven stated that they used both versions depending on where they were at the time. Participants reported using Message Builder at home, at work, or at places of study. Some users established a routine around the system, for example by checking for new messages at home before they went to bed: *"you need some time to refresh and think about what happened. That's why I only normally use it at night before I sleep"* (P19). Others described using it on the move, for example while commuting: *"I don't remember using it at home, maybe once I used it at home. But mostly at work, and in the train."* (P1). This suggests that people used Message Builder in different settings and its use was not confined to any particular configuration of time and place.

In terms of how Message Builder was used alongside existing technologies, all participants stated that they continued to use their current suite of communication tools during the study. This was because Message Builder conversations were often distinct from those held in other media, making the system complementary to established routines: *"We have our usual Google hangout session, and Snapchat... We went along as usual but with Message Builder as well. It was just a different conversation"* (P9). In other cases, technologies were interleaved to 'repair' Message Builder's lack of functionality: *"Message Builder did not replace other communication technologies... it was difficult to ascertain when my partner was online unlike other chat application indicators of people who are live online. Instead, other communication technologies helped us enhance the use of Message Builder"* (P4).

However, pairs 5, 11, and 13 described their initial attempts at using Message Builder in place of an existing technology (Telegram, WhatsApp or Facebook Messenger, respectively). They reported finding this difficult because Message Builder did not provide notifications, and chose to fall back on other tools at times when an immediate response was required: *"during the first week, we sort of tried to use Message Builder as frequent as we can. But then during the second week we got busy and he got something to ask me, and it's quite urgent so he used WhatsApp"* (P22).

5.1.3 Message Builder: User Reactions. The provocative nature of Message Builder was reflected in participants' reactions to the system. A challenge for research on close relationships is that any given relationship between two people has its own routines and idiosyncrasies, meaning that a technology which works for one pair cannot be guaranteed to work for another. This was reflected in our data, with some pairs outright rejecting Message Builder after finding it difficult to absorb into their existing communication routines. Specifically, pairs 3, 8 and 14 did not find a clear role for the application. They described trying to use it but found that its functionality was in conflict with their expectations for what messaging applications should do: *"It doesn't have its own app, where you can just tap and you enter, and you can start talking. Instead I need to wait for it to load, and it doesn't have notification"* (P13). Another reason for the lack of acceptance by these pairs may be because they described attempting to use Message Builder for what Grinter et al. [25] describe as *discrete-intensive* conversations, i.e. those in which messages are exchanged synchronously and in rapid, focused bursts [43]. Such back-and-forth conversations may be comprised of many messages that are relatively short. The escalating character requirement in Message Builder made these conversations difficult to enjoy, especially when combined with the need to continually reset in service of new messages: *"it's not as simple to use as many of the other messaging apps... It wasn't as fast as the other ones because of the reset thing"* (P5).

Despite this, the remaining 11 pairs in the study were more positive about the system and demonstrated considerable engagement with it in terms of connecting with their partner. The way in which the system differed from contemporary apps was valued by some individuals: *"It felt quite refreshing in a sense because it is something different. I would say it's something people might want to explore"* (P11). Even in cases where participants initially struggled to adapt to Message Builder's design, they identified that it had value once they had used it more extensively: *"I feel that for direct conversations like quick ones, it's a bit tough, how you have to reset the message. Because I like to use short messages. But I thought it added something different to the way that we talk, so that it sometimes forces us to talk to each other and engage with each other more"* (P18).

In line with this, some pairs described how Message Builder guided them towards a style of communication that was different to existing applications. For example, pair 10, who were in a long distance relationship, described settling into a routine in which messages sent through Message Builder became progressively longer and more in-depth as time passed by. Their style of use was more akin to that of *continuous-sporadic* exchange [25] in which the sending of individual messages was distributed over time. They described adopting a routine in which the system was used by each person once per day, and which complemented their established practice of a daily video call. For this reason, they found the system to be *"quite exciting because you tend to talk more using it, and you tend to include more things in your conversation... because I usually write more when I get a long reply. I try to answer all the questions in the previous text. Yeah, and talk more about myself"* (P19). These behaviours around message composition appear to have arisen as a direct consequence of Message Builder's design features, and we consider these in more detail in later sections.

5.1.4 Messages Sent and Character Counts. To provide an additional perspective on the use of Message Builder, Table 2 lists the number of messages sent by each pair, as well as the average number of characters within each message. It also shows the number of characters within the longest and shortest message sent by each pair, alongside the average incremental change in message length. On the surface, this data confirms that all of the participants attempted to use Message Builder in some form, with some appearing to use it extensively. Additionally, some appear to have used it in what might appear to be an 'effortful' fashion, given the overall message lengths. However, these figures must be interpreted with caution because it is not necessarily the case that a low number of messages is equivalent to non-use or 'low effort' [30]. This is especially important considering the statements listed above, with participants describing conversations in which messages became progressively longer. Such exchanges might be composed of fewer (yet much longer) messages, and this might involve high effort due to considerable time investment [30]. On the other hand, long messages might not be especially effortful if they are the result of simple copy and pasting of text.

This means that it is necessary to interpret the figures in Table 2 by making reference to participants' interview statements. First, it can be seen that some pairs sent only a few messages using the system, particularly pairs 3, 8 and 14, and that these messages were relatively short compared to those of other pairs. This makes sense given that these dyads are those who reported finding the system to have little value within their relationships. In contrast, pair 7 sent relatively few messages (29 in total) and yet achieved a much higher character count on average, indicating that their messages were longer overall. At interview, they explained a desire to explore the system while also testing each person's willingness to reply: *"she put three hundred, and I doubled it, and she doubled it... we literally summarized a day's worth of stuff that we did into one message"* (P13). Such an approach evidences the aforementioned style of escalating use, suggesting that the system had the effect of encouraging some pairs to progressively increase the length of their contributions

Pair	Total number of messages *(resets)*	Average number of characters per message	Highest number of characters	Lowest number of characters	Average change in message length
1	74 *(32)*	194	1045	8	132
2	120 *(35)*	64	178	2	45
3	19 *(6)*	39	71	6	34
4	77 *(33)*	105	2038	3	104
5	211 *(40)*	87	405	2	47
6	27 *(5)*	205	433	8	90
7	29 *(8)*	274	1377	7	214
8	22 *(6)*	46	87	5	29
9	82 *(18)*	33	100	2	21
10	40 *(5)*	503	1503	14	192
11	72 *(24)*	80	273	2	70
12	51 *(12)*	73	289	3	39
13	45 *(15)*	67	183	9	54
14	13 *(3)*	59	140	4	24
Mean	*63 (17)*	*131*	*580*	*5.4*	*78*

Table 2. Data from each pair's use of Message Builder.

by including more content within an individual message, as opposed to spreading this content out over a series of short texts.

Indeed, one individual from pair 3 noted that, despite disliking the application overall, Message Builder *"actually made me say more in less number of messages. So, usually on WhatsApp, some people type little phrases and every single phrase is a new message, and you open your phone and there are 30 notifications of one sentence. But here sometimes it's sort of made me say a lot more in one message"* (P5).

One of the most common patterns of behaviour that participants reported was using Message Builder as a game, with seven pairs seeing how long they could use the system without pressing reset: "*it's like a sort of competition, a mini competition to see like who can sort of write, get the most characters without having to reset. It was just something like to make it fun, I guess. The challenge also, to see how long we can go on without having to reset* " (P12). "*We sort of just challenged each other, to see if we could not reset the word count*" (P14).

Four pairs had a different approach, finding that their use of the system was highly contextual and only meaningful when it was integrated into their daily behaviour: "*It gets pretty fun at first, but not when you are busy, not when you are packed with a lot of stuff*" (P21). Such usage was described as akin to letter-writing ("*More like letters. It feels like you're writing a letter*" (P1)) in that participants described a need to pause for thought and dedicate time to the communication [30]. This made them delay their reply until such a time when they could respond properly: "*you need a free time. To sit down, and think what you want to talk, what you want to tell, and you need to organize stuff. Because since you are writing a long, quite long passage, you can't just simply throw out some question in the middle of the line or whatever, you need to organize the whole thing*" (P19).

5.2 Experiencing Effort Through Features of Message Builder

Having explored the patterns of use, and noting that these appear to indicate that Message Builder was sometimes capable of encouraging effort in communication, we now describe our participants' thoughts about particular design features within Message Builder.

5.2.1 Character Count as a Scaffold for Effort. The data in Table 2 demonstrates that Message Builder helped scaffold effort through encouraging participants to send longer messages. We

noted earlier that some of these messages were described in terms of 'content consolidation', i.e. participants would include everything that they wanted to say within a single long message rather than distributing this content over a series of shorter texts. Such messages could nevertheless offer a moment for reflection about what to say. For example, ten people across six pairs discussed how the increasing character count encouraged them to think more deeply about the messages they were sending: "*I think there was more of an effort to make it detailed and interesting, than just waffling*" (P2); "*I think you can't just write a quick message in Message Builder. You actually need to write about something significant*" (P1); "*sometimes it would sort of prompt me to write a longer message to avoid resetting*" (P11). This was valued in terms of an experience that required time and thought: "*I think the whole concept of having to type longer each time is actually quite interesting because it makes you think a lot more of what you actually need to type*" (P19).

Indeed, the formulation of long passages within Message Builder was not always a matter of consolidating existing ideas. Instead, Message Builder sometimes provoked experiences of *elaboration* in which conversations became increasingly long and in-depth due to the investment of additional effort. This apparent effect of reshaping the communication experience sometimes led to the topics of conversation being more personal and emotional than what participants ordinarily shared with their study partner. While nine people from eight pairs said they mainly used Message Builder for everyday matters, e.g. "*I think it was just general conversation that you'd have on WhatsApp. What's going on, what's happening, et cetera.*" (P6), 12 people from nine pairs claimed that Message Builder led them to discuss more intimate topics: "*usually the stuff we were talking on [Message Builder] wasn't something we touched on either in WhatsApp or Snapchat*" (P11), "*it's different because in the Message Builder we sort of go more in depth, there's more like personal thoughts and feelings, rather than general sort of things that's going on*" (P12).

These exchanges led some people to discover more about their conversational partner. For example, P23 described how she and her friend initially used Message Builder *"to joke around"* but then decided to *"have a deep conversation"* about philosophical issues. This conversation resulted in her partner making a series of intimate self-disclosures: "*he basically expressed himself more than I've ever heard him express himself... he replied with such a sincerity that I can't just joke around again, so I took my time, I didn't reply immediately, I waited two or three days, I made sure I had time and then I did it*" (P23). This latter aspect of her account further reflects the significance of dedicated time as a component of effortful communication [30].

Exchanges such as these may be indicative of heightened intimacy. This appears to have had an emotional impact on some of our participants: "*we definitely get to know each other more.*" (P12); "*Because of how you need to spend more time on it, as well. So yeah, definitely more thought and more care.*" (P19). "*I think it's more serious conversation... WhatsApp is easier to have a joke about things... with Message Builder, things become more serious a little bit*" (P1).

5.2.2 Interpreting Character Count as a Proxy for Effort. One of our design decisions was to display the number of characters in a message as a way for participants to keep track of message length. At the same time, this was intended to probe our participant's thoughts regarding how effort is interpreted in the context of text-based messaging. Seven participants across six pairs discussed the value of the number of characters as a proxy, each stating that it was a poor representation that actually devalued the other forms of effort they had invested into their messages: "*you don't really have to type a long message to show that you put in effort... like how much thought you put into every message*" (P25). This is of concern as it indicates that by designing a system to highlight certain types of behaviours, one might actively disincentivise other, more positive, behaviours. Such comments were, however, from pairs who were not sending substantially long messages.

The character count also calls the value of enforced effort into question: "*I don't see what's the significance of the word count, other than just kind of putting a little pressure on you to write a bit more, every time*" (P15). This indicates that while the count may have been useful as a general reminder about the status of the conversation, it was clearly not effective in terms of reflecting the various kinds of effort that users could invest into their messages.

5.2.3 The Meaning of Resetting the Character Count. To explore the limits of acceptable effort investment, we provided users of Message Builder with a 'reset' button which returned the character count back to zero. We were interested in exploring the meaning of this reset and whether it factored into greater investment of effort.

Six people from five pairs used the reset as a purely functional outlet, imbuing it with no meaning beyond allowing them to send a shorter message: "*I believe we pressed reset when we got too annoyed with having to reach the limit every time we said something*" (P10).

In contrast, six other people from a different five pairs spoke about the reset feature in a meaningful way. In this case, people found that sending a message created a social obligation to respond in kind, a convention that was broken by the reset: "*I feel it's quite irresponsible to press the reset when someone makes the effort to write a very long message to you. And you just press the reset and reply 'okay'. I think that's kind of rude.*" (P19). "*So if she put in a lot of effort then I would probably want to put in as much, so if she wrote a long, a long message. I would want to give that back, reciprocate the message because she'd put that effort in. But if she writes six hundred words, I can't just write two. So that would feel rude, sort of thing*" (P2).

When discussing their experiences in the role of recipient, participants interpreted their partner's willingness to avoid pressing reset as a sign of care and investment in the conversation: *"for me if he constantly resets it, like every time I send, it will feel to me like he's not willing to put in the thought or the effort to continue the conversation... but he didn't reset the count very often, so it felt like he really wanted to continue the conversation and keep upping the character count, sort of thing, so it showed that he wants to say something more"* (P19).

5.2.4 Channel Exclusivity: The Value of Private Talk. We consciously decided to develop a distinct communication tool rather than adapting a pre-existing technology (for example, a plug-in for Facebook Messenger). Previous work has indicated that, in some circumstances, close personal relationships can benefit from using technologies that only people in that relationship can use [20]. Ten participants across seven pairs discussed the value of this one-to-one connection. The first facet of this value came from having a unique channel for communication which does not involve anyone else: "*we have a sort of special application to communicate with each other. Like so that makes our relationship more connected in a way, because we are using a special application to communicate with each other.*" (P22); "*While we've been friends for a long time we haven't had very many things that were just for the two of us.*" (P9).

The second facet stemmed from the effort of having to use a unique platform. Four individuals across three pairs highlighted that "*in Message Builder, if a person goes into that system, it means they went into that system to reply to that person. So it does show that that person made actually an effort, and they do want to maintain a conversation with that person*" (P25). Conversely, three people disliked Message Builder for exactly this reason, citing the inconvenience of having to log on to a distinct system as something that hampered their enjoyment of the platform. This was partly due to the fact that the system was implemented as a web application rather than as a mobile app.

We can characterise this appraisal in terms of effort by using Kelly et al.'s concept of 'challenging capacities' [30]. By having to log-on to a distinct environment that was unique to the participants, there was a need to invest procedural effort in sending the messages. However, the fact that

participants attached meaning to this effort exemplifies how procedural effort can reflect a personal investment and thus bring new meaning to the use of a system [30].

5.2.5 The Effort of Checking for Messages. One of the biggest shortcomings identified by our participants was the lack of notifications for new messages in Message Builder. 19 people from 12 pairs noted that in the majority of the communication tools they use, particularly mobile apps, each received message produces a notification on their device. However, our participants had to visit their Message Builder client to see whether they had received a new message. This made the experience more like checking a pigeonhole for mail, or opening an email client to check for new messages. This procedural effort was not valued: "*Without the notifications it's pretty hard to know when he reply or anything, so I have to like constantly check it sometimes*" (P25), *"Because there was no notifications you have to be really conscious that you are not using it, and make the effort to go on the app. It's not as easy as the phone, and it's not as convenient. Which is bad"* (P7). In some cases, participants used WhatsApp and other messaging systems to notify one another about Message Builder messages they had sent. This indicates that there is value attached to features of existing systems which people find to be convenient, and which support a degree of awareness about the status of a conversation. The removal of such features may therefore not be valued if no clear benefit is derived from the additional work that is introduced as a result of this decision.

6 DISCUSSION

Our intention with Message Builder was to explore how communication technologies might be designed so as to encourage effort in close personal messaging. In turn, we wanted to explore how this effort might be differentially valued by participants, depending on the manner in which it arises. Here we review some of the key lessons learned through our study and consider opportunities for further research and design on using effort to bring people closer together.

6.1 Scaffolding Meaningful Effort in Communication

Despite some initial reservations about the functionality of Message Builder, the majority of our participants showed a willingness to engage with the system and were able to integrate it into their lives, once they had determined an appropriate pattern of use and topic of conversation. Message Builder was not a replacement for existing communication systems but instead became a complement to those that participants already used, and led to exchanges that were different to those held in applications such as WhatsApp and Snapchat. This suggests that effortful communication systems can find a role alongside more 'lightweight' outlets, provided that the effort involved makes a useful contribution to users' practices. It also implies that effortful communication systems should not be seen as a direct substitute for existing platforms, but rather as tools that can extend users' communication practices and permit new kinds of relational maintenance.

The main impact of Message Builder appears to have been in guiding participants towards writing increasingly long messages. In some cases this reflected a preference for completeness over frequency, where a series of shorter texts were consolidated into a single long message. Such messages are perhaps less interesting than those which 'go deeper', but they may nevertheless provide the sender with a moment for reflection about what they want to say. In other cases, the increasing length was reported to have fostered deep and meaningful exchanges that were more intimate than conversations that occurred in other channels. This suggests that the relatively small nudge towards writing a longer message, as caused by the incrementing character count, was sufficient to affect the structure and content of participants' exchanges. However, longer messages are not intrinsically 'better' if the accompanying content is without meaning, and thus

it is important to recognise that our participants saw an increase in effort both in terms of raw message length and in the topics discussed within the messages.

This practice of writing longer messages also appeared to shift participants' general approach to communication, with interactions conducted through Message Builder described as requiring the dedication of time and thought, two qualities that have been associated with meaningful effort [30]. Participants described needing to spend time attending to the conversation, both as a way of addressing the need to write longer messages and to acknowledge the work of their partner by reciprocating with a similar message in kind.

This demonstrates how the design of a messaging application can impact "the particulars of how conversation is done and how it is felt" [43, p. 15] within close relationships. In the case of Message Builder, the design introduced a series of demands that served to shift the creation of messages towards something that was described as more like writing a letter, an endeavour that has been positioned as effortful and intimate within the literature [34, 46]. Similarly, the need to reset the chat to send a shorter message seemed to guide participants towards sending fewer messages overall, and yet these messages were reported to be longer and more in-depth than before, which may be indicative of a shift towards higher quality of communication. Previous work has found that engaging in high-quality exchanges (as opposed to the mere quantity of messages) is associated with partner idealization [54], suggesting that such a shift may have value for close relationships.

We regard these findings as important because, while much research has been dedicated to the design of communication tools that support lightweight sharing and passive awareness, less attention has been given to the design of technologies that foster what Branham & Harrison describe as *deep interpersonal sharing* [4]. Such experiences involve moments of intense mutual reflection that allow relational partners to construct shared understandings of one another, and which "move the partners' interpretations of one another and the relationship forward" [4, p.24]. Of the pairs in our study, two reported engaging in reciprocal disclosures via Message Builder that caused them to develop new understandings. In both cases these were pairs who, despite describing themselves as close friends, clearly had more to learn about each other's thoughts and feelings. This demonstrates the potential for effortful communication to play a role in relational escalation, i.e. the experience of growing closer through mediating technologies [50]. The ability to foster deep sharing may also provide an outlet for working through difficult relational matters, as when attempting to resolve conflict via mediating technologies [49].

As a design implication, we see a broader lesson in terms of how Message Builder acted as a scaffold that *guided* users towards the investment of effort, as opposed to prompting effort through explicit invitations to connect with others [cf. 30]. This notion of scaffolding the creation of messages is one that can be applied to other applications that aim to facilitate deep interpersonal sharing, irrespective of whether the platform in question focuses on text. We note that systems such as Snapchat and Instagram are valued due to their ease of use [57] but also because they include features that allow users to create juxtapositions of expressive content, e.g. 'stories' that are composed from a series of curated images [39]. These creations allow users to invest time and effort into their exchanges, but in a manner that is optional and which remains lightweight. This emphasizes that fostering meaningful effort should not be about making things harder to do, but should instead be about allowing users to engage in effortful practices [30].

6.2 Avoiding Undesirable Effort and Supporting Authenticity

Beyond the character count and reset features, there were two aspects of Message Builder that the majority of our participants found problematic, irrespective of where and how the system was used. The first was that Message Builder did not provide users with notifications and thus called for procedural effort in terms of having to visit the system to check for new messages.

Participants described this as inconvenient and as having a negative impact on their awareness of the conversation. Similarly, some participants did not like the procedural effort that was introduced by having to access the prototype through a web browser.

Interestingly, some participants in our study recognised that their partner's willingness to talk through Message Builder demonstrated an element of care, simply because both of the involved parties understood it to be troublesome. This dovetails with the findings of Kelly et al. [30], who observed that procedural effort could be meaningful if it was known to reflect a degree of personal investment (in terms of challenges encountered) during the exchange.

As a design implication, Message Builder demonstrates that there is some balance to be found between guiding people towards moments of effortful maintenance while also retaining the qualities of contemporary messaging applications that make them convenient for people to use. While it may be true that having to endure some procedural effort does convey information about a person's engagement in the conversation, our participants saw this effort as undesirable because it was irrelevant to the primary goal of formulating messages. This suggests that any potential gains which stand to be accrued from demanding effort in the *access* of a system must be carefully weighed against the inconvenience this presents to users.

Our results also suggest that people have a better appreciation and understanding of effort when that effort is clearly evidenced through the scaffold. In the case of Message Builder, this was achieved through the visible character count. As one participant said, "*you actually see the traces of the things you're doing*" (P1). Although our study drew attention to the limitations of the character count as a proxy for meaningful effort, it still appears to be the case that revealing something about the effort invested in a message can have meaning for interlocutors. This suggests that mechanisms for representing effort, if designed as part of the scaffold, would be a rich seam of design inspiration, and aligns with the claims of Kelly et al. [30] who suggested that systems "could increase the visibility of sender activity in order to signal the amount and type of effort contributed" [30, p. 79]. Similarly, Podlubny et al. suggested that designers might "consider ways for people to [...] reveal how they construct messages" [43, p. 17] as a way of fostering intimacy in conversation. Future research should therefore focus on different ways of *representing* meaningful effort in mediated conversation, so as to provide a better reflection of invested effort. As an example, it may be possible to incorporate biosignals such as heart rate [28] or EEG data [35] as a way of creatively supporting awareness about the effort that a person has invested.

This kind of functionality could also help people to assess the authenticity of invested effort. Some of our participants reported appropriating Message Builder in a manner that was game-like, challenging their partner to write more by writing more themselves. This sometimes occurred in a way that was playful, but could also have arisen through participants simply copy and pasting content into the application in order to provoke a response from their partner. This points towards a tension in the design of Message Builder; namely, that the character requirement helped to structure participants' conversations in a way that was valued, but could have just as easily encouraged effort that was meaningless. Providing insight into the actions taken to develop a message would therefore help users to consider the authenticity of effort beyond what is possible on the basis of a received message [46], and might provide a level of accountability that would dissuade people from investing meaningless effort [2]. This could also support experiences of heightened intimacy during special occasions that warrant more effort than normal, e.g. marital celebrations [30].

6.3 Future Directions for Effortful Communication

Our study opens the floor to several directions for research on effort in communication. First, this study focused on effort in text-based communication, but effort can be evidenced through different media including videos, pictures and audio. In particular, the use of audio messages is becoming

more popular [61] and some of our participants cited the lack of expressive content as a functional limitation of Message Builder. This points towards an opportunity to understand how effort can be recognised and supported in different kinds of media, beyond text-based communication.

In the exchange of pictures, for example, effort may be evidenced through the selection of the picture itself, particularly if the picture bears some clear link to the interests of the recipient [30]. Alternatively, effort might be shown through the incorporation of expressive media such as emoji, which are relatively trivial to produce and yet have a high ceiling in terms of intimate expression [31]. Studying these media would give a better understanding of how effort can be fostered in the production of this content, together with additional knowledge of how a record of effort affects the interaction over time. As an example, Snapchat includes a feature known as *streaks*, where the record of exchanges between users is tracked by the application and is displayed alongside each contact's username. The streak increments if users successfully exchange pictures once a day. Then, as more content is exchanged, users are rewarded with different emoji that reflect the status of the streak, e.g. a 'fire' or a 'mountain' to symbolise their efforts [36]. While this may initially encourage users to participate in meaningful exchanges, reports in the popular media indicate that these streaks can devolve into a simple process of 'checking in', with users focusing on maintaining the streak for its own sake rather than putting effort into the content they send [18, 36].

Second, it is worth noting that the effort introduced by Message Builder had an impact on synchronous conversations, which participants found difficult to conduct because of the need to increment the length of messages and continually reset the chat. These new costs undoubtedly presented a barrier to the patterns of quick-fire exchange that characterise synchronous conversation [25], and were sufficient to convince three pairs in our study that Message Builder was not suitable for their relationship. One interpretation of this finding is that even a small increase in user effort, whether in the use of a system or in the experience of writing messages, may hamper people's ability to engage in synchronous conversation, simply because such conversation already places greater demands on people's time [43]. However, it is more likely that Message Builder's functionality was simply not amenable to fostering effort in these exchanges. In other words, the forms of effort that are acceptable in synchronous exchange may require an entirely different approach to the one explored in this paper. This should stimulate further research on effort in synchronous conversation. It may be the case that effortful interaction is best supported by asynchronous modes of exchange, simply because asynchronous media afford users with time and space to dedicate to the act of communication.

6.4 Limitations and Future Work

Our study has several limitations. First, we acknowledge that Message Builder was an unfamiliar technology to our participants and thus their engagement with it may have been partly fostered by its novelty and their participation in the study. This is an issue for studies of new communication technology in general and can only be resolved through longer term deployments.

In terms of our study design, our approach was bookended, using pre- and post- study interviews. The downside of this is that participants might have forgotten useful information about Message Builder by the time of the second interview. We decided not to collect participants' views during their use of Message Builder so as to minimise the burden on participants. However, use of the experience sampling method [11] or the verbal diary approach used by Andalibi et al. [2] would have given us additional data about participants' use of the system.

Another possibility for future work would be to explore people's preferences for engaging in effortful communication across different computing devices. We did not log exact counts of whether messages were sent via the desktop or mobile versions of Message Builder. It is reasonable to assume that the use of a mobile device could affect people's willingness to invest effort. Probing

this more deeply would give a better understanding of when and how people are likely to dedicate time and effort to communication.

Future work could also study the way in which effortful communication practices are affected by relationship type and geographic arrangement. Our study focused on exploring effortful communication as a general prospect, and we did not see any consistent differences between romantic partners and friends in terms of their engagement with Message Builder. However, one nuance in our data concerns the fact that some platonic pairs reported instances of heightened self-disclosure whereas romantic partners did not. The prevalence of particular relational maintenance strategies is known to differ between couples and friends [8] with close friends more likely to engage in openness through IM than romantic partners [45]. This may be reflective of the patterns witnessed in our study, and examining specific strategies in more detail would provide an enhanced understanding of the types of behaviours that emerge in effortful communication systems.

7 CONCLUSION

In this paper we have contributed the first field trial of a communication system designed to provoke effortful messages from users. Our study is the first to explore how effort can be factored into the design of a messaging system, and builds on previous work that has identified the importance of effort without probing its value in practice [30, 37]. We have found that effort in communication may be acceptable to users if it is instantiated in a way that is productive and which does not present an inconvenience to accessing the system. At a broader level, we have found that the use of an effortful communication system can encourage users to spend time and thought on their messages, and that this can foster new kinds of relational maintenance. Our findings lend support to existing design frameworks which have identified the potential for effort to be encouraged by mediating technologies [e.g. 20, 27] but which were lacking first-hand evidence of its potential.

We began this paper by noting that contemporary messaging systems increasingly include features that try to alleviate the 'burden' of writing messages. These features are undoubtedly well-intended, and may have some utility for supporting particular kinds of exchange. Yet the risk of their proliferation is that the meaningful effort required to maintain close relationships may be lost in favour of exchanges that are constructed around immediate and simple resolution. As highlighted by Turkle [56], the continual pursuit of streamlined interactions may devalue the authentic qualities of relationships to the point where our exchanges with others become stilted, mechanical, or even robotic. We hope that our work can help to support the design of systems that, rather than trivialising the interactions we have with others, lead to the kinds of experiences that remind us of what it means to be human.

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